Clean Power Plan Implementation:
Overview of Potential Compliance Pathways

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Introduction

The Environmental Protection Agency's (EPA's) Clean Power Plan—the proposed rule to regulate carbon dioxide emissions from existing fossil fuel-fired power plants[2]—provides states with flexibility to develop their own state compliance plans and to select measures through which to implement and enforce those plans. This document provides a brief overview of potential compliance approaches states could choose to use as the basis for their plans, followed by a matrix comparing key characteristics of each potential approach.

Potential State Compliance Approaches under the Clean Power Plan

In the preamble to the proposed rule and in the supporting State Plan Considerations Technical Support Document (TSD),[3] EPA describes several approaches for states to consider as they develop plans to comply with the Clean Power Plan. The approaches fall into two categories: (1) direct emission limits on electric generating units (EGUs) holding affected EGUs "fully and solely responsible for achieving the emission performance level,"[4] which we refer to as an "EGU Compliance Program"; and (2) a portfolio approach that relies "in part on measures imposed on entities other than affected EGUs to achieve at least part"[5] of the emission performance level, which we refer to as an "EGU-Plus Compliance Program." As outlined in the State Plan Considerations TSD, under either approach states may choose to demonstrate compliance by meeting EPA's proposed rate-based goal for the state or by meeting an equivalent mass-based emission budget.[6]

EGU Compliance Programs

Under an EGU Compliance Program the owners or operators of affected EGUs are solely responsible for demonstrating compliance with the emission standard. In a rate-based program, the state could either require all affected sources to operate at or below the standard (expressed as pounds of CO_2 emitted per megawatt hour of electricity generated), or the state could choose to allow crediting and require sources to hold credits that bring the unit into compliance if its emission rate exceeds the standard (discussed in more detail below). Under a rate-based standard, states could also allow averaging among affected sources. In a mass-based program, the source would be required to hold an allowance for every ton of CO_2 emitted; the total number of allowances would be equal to the state's mass-based emission budget. Under such a mass-based approach, states could establish a CO_2 emissions budget for a group of sources and allow trading for compliance.

A key feature of an EGU Compliance Program is that the federally-enforceable obligation on EGUs would be sufficient to achieve the required level of emission performance for the state, either by meeting the aggregate emission rate (adjusted to include credits for renewable energy, creditable nuclear generation, and credits for

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[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule, 79 Fed. Reg. 34830 (June 18, 2014). The proposed rule and supporting documents are available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule. A detailed summary of the rule prepared by the Georgetown Climate Center is available here: http://www.georgetownclimate.org/detailed-summary-of-the-epas-proposed-rule-to-limit-carbon-pollution-from-the-power-sector.

[3] Available at: http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-state-plan-considerations.

[4] 79 Fed. Reg. at 34901.

[5] *Id*.

[6] State Plan Considerations TSD at 7, 8.

energy efficiency) or by meeting the aggregate mass-based emission budget. The owner or operator of the EGU would be the party responsible for compliance and would be subject to citizen suits and EPA enforcement in the event of non-compliance.

One example of a potential EGU Compliance Program a state could choose to implement is a **rate-based trading system**, under which the owner or operator of each affected EGU would be required to have its EGU meet the rate-based emission target after adjusting for any credits held by the owner or operator. Owners or operators of affected EGUs not currently meeting the emission rate could either take actions to improve the unit's emissions rate or purchase credits sufficient to meet the rate for each megawatt hour of electricity that the EGU generates. Such a rate-based credit trading system could work by assigning credits to EGUs emitting at a rate lower than the standard, which could be purchased by EGUs emitting at a rate exceeding the standard. Credits could be calculated based on the difference between the actual emissions rate of the unit and the compliance rate, reflected as the number of pounds or tons of CO_2 below the standard the unit emitted over the compliance period. As described below, credits could also be generated by zero-emitting resources and by demand-side energy efficiency measures.

Another example of an EGU Compliance Program is a **mass-based trading system**, under which the owner or operator of a unit would be required to hold allowances or credits equal to the annual CO_2 emissions from the unit (in pounds or tons). The state could choose to assign these allowances or credits at no cost to EGUs or to sell them at auction; units with excess credits could sell credits to other units for compliance. If a state chooses to implement a mass-based trading program in which some or all of the allowances are sold at auction, this would raise revenue that the state would then decide how to use. For example, revenue could be invested into energy efficiency programs, which could make compliance more cost-effective and create local jobs. Alternatively, the revenue could be refunded to electricity consumers or used for other purposes.

A key difference between rate-based compliance and mass-based compliance under an EGU Compliance Program is the treatment of zero-emitting resources, including nuclear and renewable energy, and demand-side energy efficiency. Since EPA's proposed rate-based state goals take into account the potential for shifts in generation to renewable energy, avoided emissions from new and at-risk nuclear generation resources,[7] and reductions in electricity load through energy efficiency, EGU Compliance Programs must have a way of allowing EGUs to incorporate reduced or avoided emissions from these resources into the system. A mass-based emission budget system inherently accounts for reductions in generation from fossil fuel-fired EGUs that result from these zero-emitting and energy efficiency resources, in that fossil fuel-fired EGUs will generate less electricity, causing total emissions to decrease. In contrast, reductions in fossil fuel-fired generation under a rate-based compliance system will not necessarily result in improvements in the emission rate of affected sources. Therefore, a rate-based system requires a mechanism to credit zero-emitting resources and demand-side energy efficiency. EPA proposes that these resources could be credited as either avoided generation in megawatt hours or as avoided emissions in tons or pounds of CO_2. A state or other entity could certify credits from providers of zero-emitting generation or demand-side efficiency resources; these credits could be purchased by EGUs that exceed the emission rate standard and applied to adjust the EGU's rate (i.e., avoided megawatts would be added to the EGU's generation; avoided tons or pounds of CO_2 would be subtracted from the EGU's emissions).

If states were to credit zero-emitting generation and energy efficiency under a rate-based compliance program, they would be required to demonstrate that the measures have real and verifiable effects on electricity generation or emissions. To do this, states would have to use existing systems for evaluation, measurement, and verification (EM&V); modify those systems; or develop new ones based on EPA guidance.

Although EPA's proposal does not specifically address a **carbon fee approach**, some stakeholders have suggested that states could implement such an approach, under which the state or other entity would impose a fee

[7] In the Clean Power Plan, EPA proposed that new nuclear generating units under construction and a portion of nuclear generation from existing units—reflecting the overall risk of some portion of existing units closing for economic reasons—be included in calculating state goals and also be creditable for compliance. Many stakeholders have commented on how and whether to include nuclear generation resources in goal computation and compliance in response to this proposal.

on EGUs for every ton of carbon dioxide emitted to the atmosphere. The fee would be set at a level projected to create a price signal that could drive the necessary reductions to meet the emission limits established by EPA. The program administrator could collect the carbon fees and could use them in a variety of potential ways as decided by the state. For example, some stakeholders have suggested the funds could be redistributed to consumers. In states with organized markets, the generator could include the fee in its bid into the ISO or RTO market, based on the EGU's CO_2 emissions. In states without organized markets, vertically-integrated utilities could incorporate the fee into decisions to determine the least-cost dispatch available to serve load. While EGUs would be required to pay the fee as part of the state plan, under the framework described in EPA's proposal the state would ultimately have to demonstrate to EPA that the state is meeting the required emission performance level, and the plan could be required to include backstop commitments that would guarantee that the level is met.

Table 1 compares some of the key program characteristics of rate-based trading, mass-based trading, and carbon fee-based EGU Compliance Programs. A carbon fee approach could potentially also be part of an EGU-Plus Compliance Program depending upon how the fee is used in the state plan.

EGU-Plus Compliance Programs

Under an EGU-Plus Compliance Program, a state plan would rely in part on enforceable obligations on EGUs and in part on other measures, which together would achieve the required level of emission performance, expressed as either a mass-based or rate-based limit. In contrast to an EGU Compliance Program, the limit on affected EGUs in an EGU-Plus Compliance Program would not be sufficient on its own to guarantee that the state would meet its goal. For example, a state plan might include a requirement that EGUs meet emission rates that would not be sufficiently stringent on their own to meet the state's emission rate goal. Alternatively, a state plan might require EGUs to hold allowances in an economy-wide cap and trade program that, on its own, would not guarantee emission reductions from affected EGUs sufficient to meet the state's Clean Power Plan emission budget. Instead, in either circumstance, the state would demonstrate to EPA that the combination of the EGU emission performance obligation and emission improvements expected from other measures included in its portfolio would be projected to achieve the required level of aggregate emission performance. An EGU-Plus Compliance Program would not necessarily require translation of zero-emitting generation and energy efficiency measures into credits to be used by EGUs for compliance; however, state plans that include enforceable energy efficiency or renewable energy measures would be required to include approvable frameworks for EM&V.

One example of an EGU-Plus Compliance Program is a **state-driven portfolio approach**, under which a state plan would include both enforceable obligations on affected EGUs and a portfolio of other enforceable measures, such as a Renewable Portfolio Standard (RPS) and/or Energy Efficiency Resource Standard (EERS). In a state-driven portfolio program, a mix of entities could have enforceable obligations under the state plan, potentially including:

- Owners and operators of EGUs subject to direct emission limits (which could take the form either a rate- or mass-based trading program);
- Electric distribution utilities responsible for meeting energy efficiency or zero-emitting resource requirements;
- Private or public third-party entities responsible for meeting energy efficiency or zero-emitting resource requirements; and
- State agencies or authorities that administer programs to deploy energy efficiency and zero-emitting resources.

Another example of an EGU-Plus Compliance Program is a **utility-driven portfolio approach**, which could be implemented in states with vertically-integrated, state-regulated utilities, as noted in the State Plan Considerations TSD.[8] Under this variation, a vertically-integrated utility would develop and implement a portfolio of measures designed to meet the state's rate-based or mass-based emission performance level. For example, a utility-driven portfolio compliance plan might include measures such as shifting generation to natural gas combined cycle

[8] State Plan Considerations TSD at 10.

(NGCC) units, increasing zero-emitting generation, and reducing load through demand-side energy efficiency as plan elements. Such a plan could be developed and approved through an integrated resource planning (IRP)-like process overseen by the state public utility commission (PUC). Under this utility-driven approach, the entire portfolio of obligations under the plan would be enforceable against the utility, as both the owner and operator of affected EGUs and the entity responsible for implementing other plan measures. In states with more than one vertically integrated utility or with affected units not owned or operated by a vertically integrated utility, the state might apportion the emission performance obligation among utilities or might apply the utility-driven portfolio approach to a large, vertically integrated utility and use another approach for other affected units.

The utility-driven portfolio approach could also be used in states with municipally-owned utilities or utility cooperatives. However, EPA notes that such a use of this approach could introduce enforceability considerations, since these entities are often not regulated by state PUCs; instead of PUC oversight, the state would have to identify the appropriate authority to oversee the development of the plan and enforcement of the plan's components.

In the preamble to the proposed rule, EPA outlines and takes comment on another approach that fits within the EGU-Plus Compliance Program framework. Under this **state commitment approach**, the state plan would include a federally enforceable commitment by the state to implement state-enforceable measures such as an RPS or EERS that would achieve a portion of the required rate- or mass-based emission performance level. Under this approach, only the requirements for affected EGUs and the commitment by the state to achieve the necessary emission reductions would be federally enforceable; state requirements for entities other than affected EGUs would not be components of the state plan and would not be federally enforceable. If the state programs fail to achieve the expected emission reductions, the state could be subject to citizen suits and EPA enforcement actions. A number of stakeholders have suggested that a state commitment compliance plan would be required to include a source-level federally-enforceable backstop to ensure that required reductions would be achieved. Stakeholders have also suggested that such plans could include interim contingency measures to be automatically implemented if the state programs are not achieving the emission reductions necessary to meet the state's commitment.

Table 1 includes a comparison of some of the key program characteristics of these three EGU-Plus Compliance Program approaches: state portfolio, utility portfolio, and state commitment.

Table 1. Review of Key Characteristics for Illustrative State Compliance Programs

Program Characteristics	EGU Compliance Program (Emission Obligations on EGUs Only)			EGU-Plus Compliance Program (Emission Obligations on EGUs + Other Policies)		
	(1) Rate-based Trading	(2) Mass-based Trading	(3) Carbon Fee	(4) State Portfolio	(5) Utility Portfolio	(6) State Commitment
Responsible Party	Owners/operators of affected EGUs must meet rate or hold credits	Owners/operators of affected EGUs must hold allowances or credits to match emissions	Owners/operators of affected EGUs must pay fee (or apply fee in dispatch) State must show that sources in the state are collectively meeting the rate- or mass-based standard	Owners/operators of affected EGUs must comply with portion of standard that establishes EGU obligation State and responsible parties under identified programs (e.g., EGU owners/ operators, distribution companies) must show programs are meeting the assigned portion of the standard	Utilities, as EGU owners/operators and parties responsible for other portfolio measures, must demonstrate compliance with the rate- or mass-based standard for their fleet of affected EGUs	Owners/operators of affected EGUs must comply with portion of standard that establishes EGU obligation State must show state-enforceable programs are meeting the assigned portion of the standard
Demonstration Units	lbs/MWh	Tons	lbs/MWh or tons	lbs/MWh or tons	lbs/MWh or tons	lbs/MWh or tons
Affected EGU Components						
Requirement on Affected Sources	Meet rate or hold credits	Hold allowances to match emissions	Pay fee based on emissions	Meet rate or tonnage limit established by state	At utility discretion	Meet rate or tonnage limit established by the state
Affected Source Compliance Credit Units	Avoided MWh of generation or avoided pounds or tons (credits generated by affected or non-affected source actions)	Tons	No credits	Only if plan includes trading component	Only if plan includes trading component	Only if plan includes trading component
Creditable Actions by Non-Affected Sources	Avoided generation or generation at a rate below the standard, including zero-emitting generation	None	None	If plan includes trading component could include avoided generation or generation at a rate below the standard	If plan includes trading component could include avoided generation or generation at a rate below the standard	If plan includes trading component could include avoided generation or generation at a rate below the standard

Program Characteristics	EGU Compliance Program (Emission Obligations on EGUs Only)			EGU-Plus Compliance Program (Emission Obligations on EGUs + Other Policies)		
	(1) Rate-based Trading	(2) Mass-based Trading	(3) Carbon Fee	(4) State Portfolio	(5) Utility Portfolio	(6) State Commitment
Additional Components						
Requirements on Non-Affected Sources	None	None	None	At state discretion (e.g., RE or EE requirement)	At utility discretion (e.g., RE or EE requirement)	At state discretion, only state-enforceable (e.g., RE or EE requirement)
Treatment of Zero-Emitting Resources and Energy Efficiency	Could be defined as a credit-eligible resource under EGU trading system	Inherently accounted for if reduces affected EGU generation	Inherently accounted for if reduces affected EGU generation	If included in state plan, federally enforceable	If included in utility plan, federally enforceable	State-enforceable
Other Plan Components and Interactions						
Key State Authorities	Environmental agency; lead authority for EE/RE EM&V (e.g., PUC)	Environmental agency	Environmental agency; fee setting authority; fee collecting authority	Environmental agency; lead authority for EE/RE EM&V (e.g., PUC); lead authority for other included programs	Environmental agency; lead authority for EE/RE EM&V; PUC or other system planning body	Environmental agency; lead authority for EE/RE EM&V (e.g., PUC); lead authority for other included programs
Tracking or Accounting Platforms	- EGU emissions and generation tracking - EGU credit tracking and system for auction/ distribution - RE & EE generation verification and tracking	- EGU emissions tracking - EGU allowance tracking and system for allocation/auction - Depending on how double counting is addressed, may require RE/EE tracking	- EGU emissions tracking - Fee collection - Depending on how double counting is addressed, may require RE/EE tracking	- EGU emissions and generation tracking - Program compliance tracking (i.e., RE verification, EE verification, etc.) - If plan includes trading component, would also require tracking and accounting components in columns 1 or 2	- EGU emissions and generation tracking - Program compliance tracking (i.e., RE verification, EE verification, etc.) - If plan includes trading component, would also require tracking and accounting components in columns 1 or 2	- EGU emissions and generation tracking - Program compliance tracking (i.e., RE verification, EE verification, etc.) - If plan includes trading component, would also require tracking and accounting components in columns 1 or 2
Mechanism to Link to Other State Programs	States could accept credits from other states (RE, EE, possibly creditable nuclear and fossil) or elect to comply on the basis of a multi-state rate	States could accept common allowances from other states or elect to comply on the basis of a multi-state budget	States could work with RTO/ISO or other regional coordinating body to jointly administer carbon fee	States could accept a common credit for certain programs (e.g., RECs generated in specific states) or propose a regional portfolio approach	States could submit coordinated plans that allow utilities to meet pooled budgets, or states could submit a joint plan that combines utility assets in multiple states	States could accept a common credit for certain programs (e.g., RECs generated in specific states) or propose a regional approach